

# U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

**April 2014 – Eighty four percent of groundwater levels and ninety one percent of monthly mean streamflow values were normal or above normal in the Maryland-Delaware-District of Columbia region.**

## Why is it important for the USGS to collect and analyze water-resources data?

USGS water data are valuable to the public, researchers, water managers, planners, and agricultural users, especially during floods and droughts. These data can be used to assess how water resources respond to changes in climate. Scientists at the USGS have measured streamflow and groundwater levels in wells to assess water resources for over 125 years.

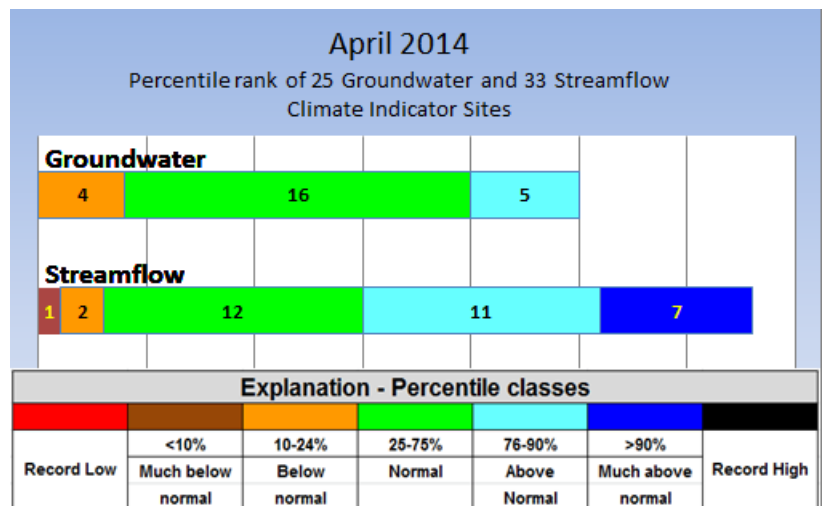
In addition to providing the most extensive set of historical streamflow and groundwater data available to the public, the USGS collects water data and quality-assures the data by employing standardized techniques across the country. The uniformity of the dataset allows for multi-state comparisons and other comparative statistical analyses that better inform policy makers of the possible water resources conditions they might encounter in the future.

The sites used in this water summary were carefully selected to show the response of streamflow and groundwater levels to weather conditions. Ideally, these sites will show no effects from human influences. The streamflow and groundwater data are ranked in comparison to the historical record and summarized. Precipitation and reservoir data are also presented to give a more complete picture of the region's water resources.

## USGS April 2014 Water Conditions Summary

Eighty four percent of the groundwater levels and 91 percent of the monthly mean streamflow values at sites used to monitor the response of water resources to changes in climatic conditions in Maryland, Delaware, and the District of Columbia were normal (between the 25<sup>th</sup> and 75<sup>th</sup> percentiles) or above normal (greater than the 76<sup>th</sup> percentile) in April.

Groundwater levels were in the normal range in 16 of the 25 USGS observation wells used to monitor climatic conditions in Maryland and Delaware. Five wells had above normal (above the 75<sup>th</sup> percentile) groundwater levels and four wells had below normal groundwater levels (below the 25<sup>th</sup> percentile).



A **percentile** is a value on a scale from 0 to 100 that indicates the percent of a distribution that is equal to or below it. A percentile between 25 and 75 is considered normal.

For example, a groundwater level in the 90<sup>th</sup> percentile is equal to or greater than 90 percent of the values recorded for that month.

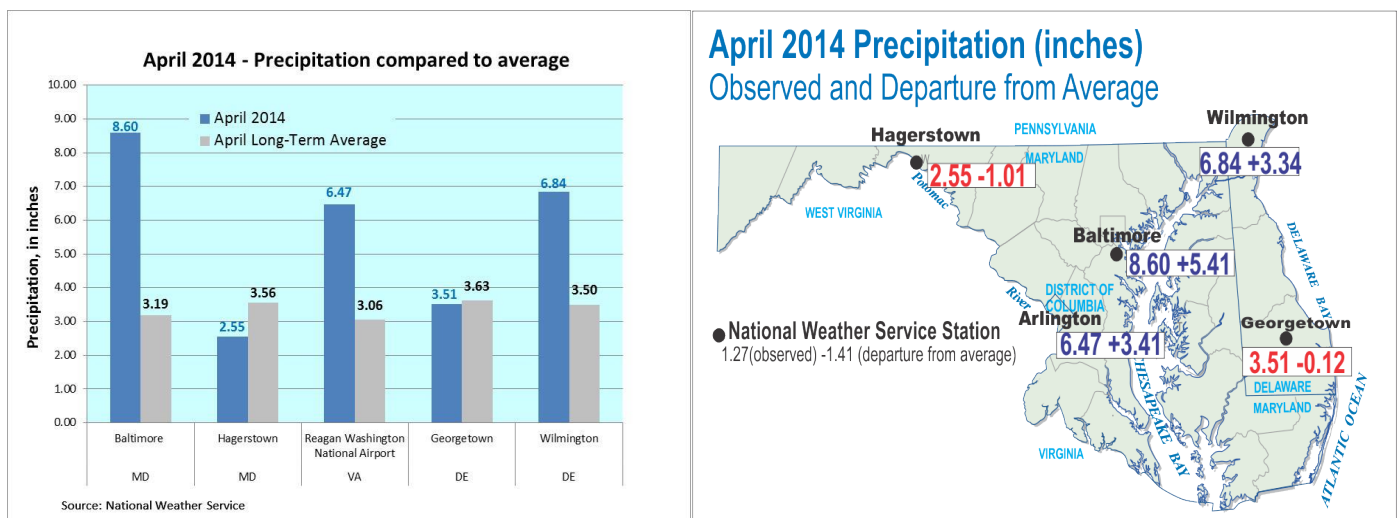
Monthly mean streamflow in April was normal at 12 of the 33 streamgages used as climate indicator sites, and above normal at 18 other streamgages, including seven sites above the 90<sup>th</sup> percentile. There were three sites with below normal monthly mean streamflow—streamflow at two sites was below the 25<sup>th</sup> percentile and at one site was below the 10<sup>th</sup> percentile.

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## April 2014 Precipitation and Weather

Precipitation in April was more than double the long-term average at National Weather Service (NWS) stations in Baltimore, Maryland, Wilmington, Delaware, and Arlington, Virginia. Precipitation in Baltimore was the highest with 8.60 inches of rain and most of it fell over a few days. Precipitation was about an inch below normal (2.55 inches) at the weather station in Hagerstown, Maryland, and just below the long-term average in Georgetown, Delaware.

The NWS Middle Atlantic River Forecast Center's 365-day precipitation data show that 6 counties in Maryland and Delaware were classified as average and 17 counties had above average precipitation for the 365-day period ending in April.



April temperatures were below the long-term average at the five NWS stations in the Mid-Atlantic region.

\*The NWS normal (long-term average) period used for determining records is from 1981–2010.

### National Weather Service Stations

- Baltimore** = Baltimore/Washington International Thurgood Marshall Airport (BWI)
- Georgetown** = Georgetown, Sussex County Airport
- Hagerstown** = Hagerstown Regional Airport
- Arlington** = Ronald Reagan Washington National Airport
- Wilmington** = New Castle Airport

### Sources:

National Weather Service  
 MD and DC: <http://www.weather.gov/climate/index.php?wfo=lsx>  
 DE: <http://www.weather.gov/climate/index.php?wfo=phi>  
 Middle Atlantic River Forecast Center (MARFC): <http://www.erh.noaa.gov/marfc/Precipitation/Departures/>

# U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

## Groundwater

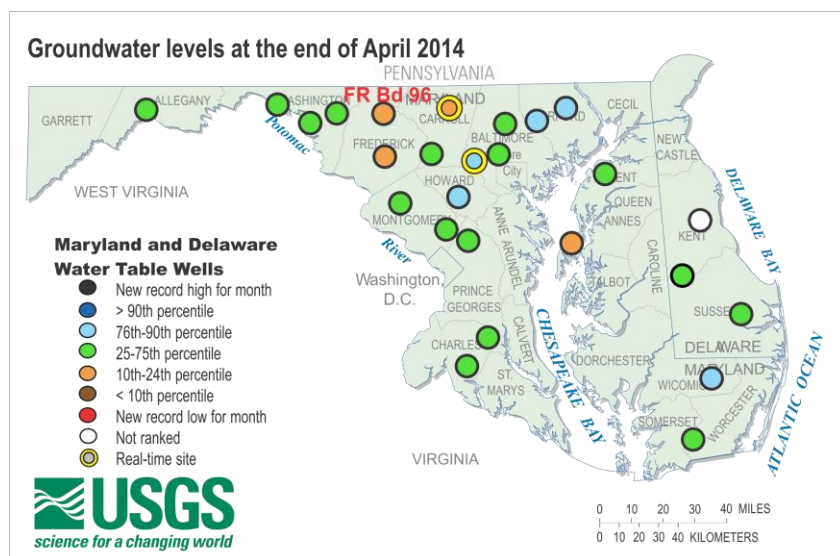
The USGS monitors groundwater levels in unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in climatic conditions. Twenty-six groundwater wells were selected based on the following criteria:

- Located in an unconfined (water-table) aquifer;
- Open to a single, known hydrogeologic unit/aquifer;
- Groundwater hydrograph reflects changes in climatic conditions;
- No indicated nearby pumpage and likely to remain uninfluenced by pumpage, regulated streamflow, or changes related to human activities;
- Minimum period of record is 10 years of continuous/monthly records;
- Minimally affected by irrigation, canals, drains, pipelines, and other potential sources of artificial recharge;
- Well has casing – dug wells are generally not used;
- Water levels show no apparent hydrologic connection to nearby streams;
- Well has never gone dry; and
- Long-term accessibility likely.

## April 2014 Groundwater Levels

Groundwater levels were normal (between the 25<sup>th</sup> and 75<sup>th</sup> percentiles) in 16 of the 25 wells used to monitor climatic conditions in Maryland and Delaware in April. Five of the remaining wells had above normal groundwater levels. There were four wells in Maryland with below normal groundwater levels.

Groundwater levels in Delaware were normal at the three observation wells in April. The well in Kent County has been at normal to above normal levels since the fall of 2012, or during the last 19 months.

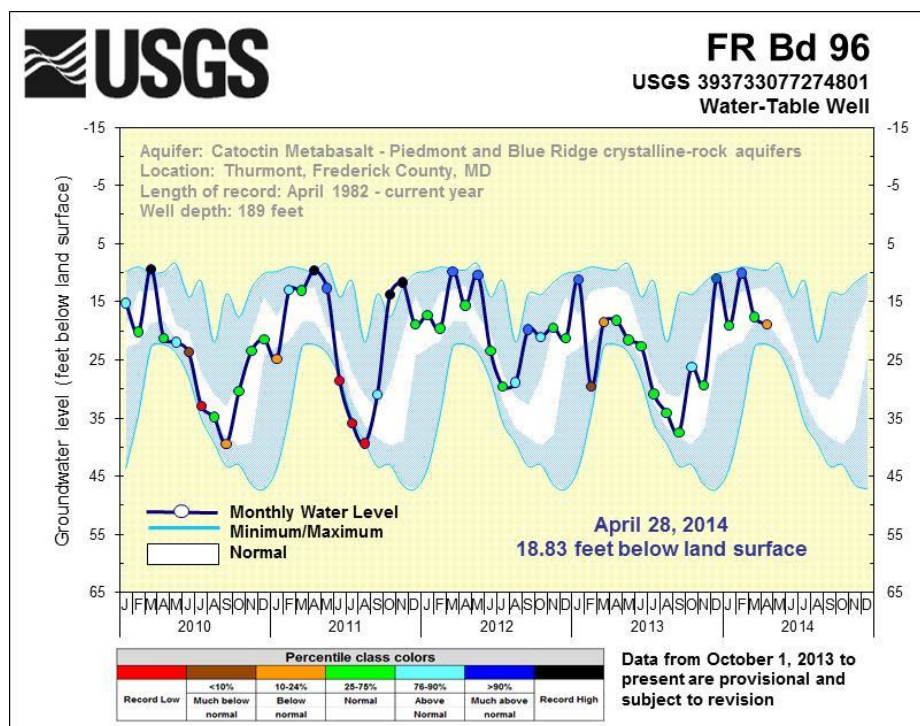


To access the clickable groundwater map, go to:

[http://md.water.usgs.gov/groundwater/web\\_wells/current/water\\_table/counties/](http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties/)

## U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

The groundwater level in observation well FR Bd 96 in Frederick County, Maryland dropped below normal (below the 25<sup>th</sup> percentile) in April. The groundwater level had been near a record monthly high in February.



Five-year groundwater hydrographs can be viewed at:  
[http://md.water.usgs.gov/groundwater/web\\_wells/current/water\\_table/counties](http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties)

These 5-year hydrographs show groundwater levels as a dark blue line, the minimum and maximum monthly values, and the normal range (between the 25<sup>th</sup> and 75<sup>th</sup> percentiles) as a white band based on the period of record. The maximum water level is at the top of the upper blue section and the minimum water level is at the bottom of the lower blue section in the graph. Each monthly measurement is colored according to the percentile rank in which it falls for the month.

# U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

## Streamflow

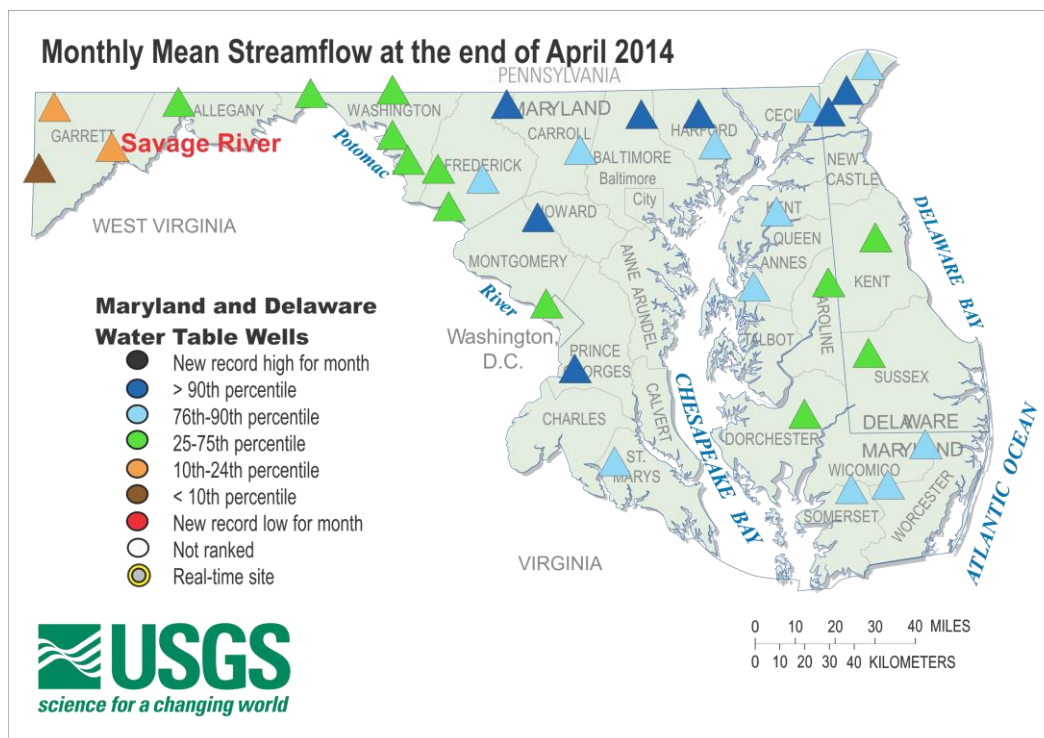
Streamflow data are used for many purposes. A few of the most obvious uses are to assess water supply and the risk of droughts and floods. Streamflow data are also used to calculate loads of chemical constituents and assess how biological communities are affected by hydrologic conditions. The USGS operates the most extensive network of streamflow gages in the region.

The streamflow locations chosen for the monthly water summary were selected based on the following criteria:

- Minimum period of record is 10 years of continuous data;
- Watershed areas greater than 5 square miles;
- Streamflow is not regulated, or has relatively natural flow;
- Streamflow data reflect climatic conditions; and
- The surrounding area and watershed are not urban.

## April 2014 Streamflow

Monthly mean streamflows were normal at 12 of the 33 USGS streamgages used to monitor climatic response in Maryland, Delaware, and the District of Columbia in April. Normal is considered to be between the 25<sup>th</sup> and 75<sup>th</sup> percentiles. Streamflow was between the 76<sup>th</sup> and 90<sup>th</sup> percentiles at eleven USGS streamgages and above the 90<sup>th</sup> percentile at seven USGS streamgages. Monthly mean streamflow was below normal at the three streamgages in Garrett County, Maryland.



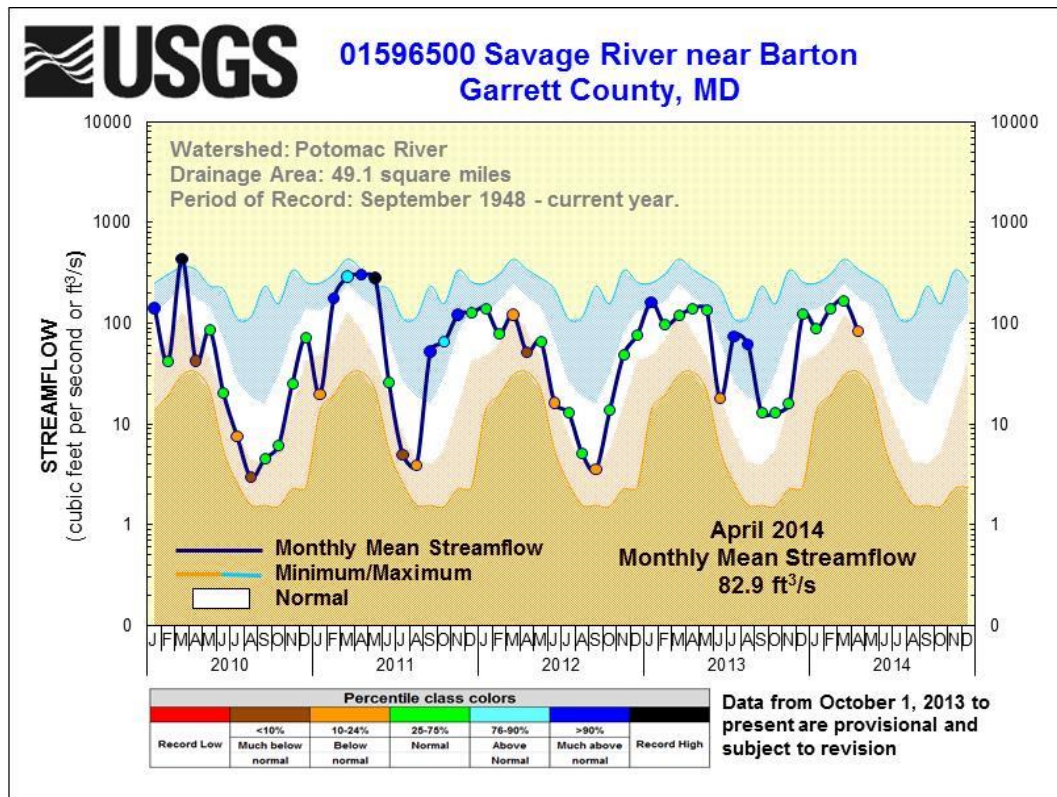
To access the clickable streamflow map, go to:  
<http://md.water.usgs.gov/surfacewater/streamflow/>



## U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

The monthly mean streamflow on the Savage River in Garrett County, Maryland was 82.9 cubic feet per second (ft<sup>3</sup>/s), which is just below normal for April.

The dark line in the 5-year hydrograph represents the monthly mean streamflow for this period and the white band shows the normal range (25th to 75th percentiles) based on the period of record. The maximum monthly mean streamflow is at the top of the blue shaded section, and the lowest monthly mean streamflow is at the top of the dark orange area. Each monthly mean measurement is colored according to the percentile rank in which it falls for the month.

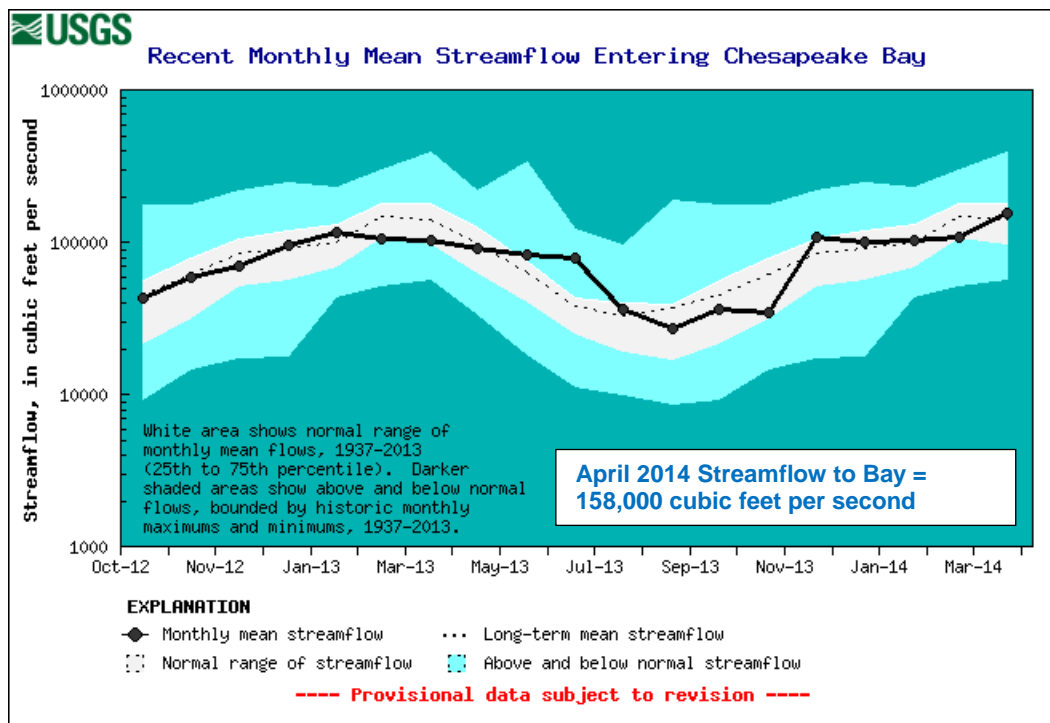


Five-year hydrographs can be viewed at:  
<http://md.water.usgs.gov/surfacewater/streamflow/>

# U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

## Estimated Streamflow to the Chesapeake Bay

The estimated monthly mean freshwater streamflow to Chesapeake Bay was in the normal range in April 2014 at 158,000 ft<sup>3</sup>/s (provisional, and subject to revision). The average (mean) monthly streamflow for April is 143,000 ft<sup>3</sup>/s. The normal range for average (mean) monthly streamflow for April is between 95,700 ft<sup>3</sup>/s and 179,000 ft<sup>3</sup>/s, the 25<sup>th</sup> and 75<sup>th</sup> percentiles of all April values. These provisional statistics are based on a 77-year period of record.



Data and more information on the freshwater flow to the Bay can be found here:  
<http://md.water.usgs.gov/waterdata/chesinflow/>

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## Reservoir Levels

Available reservoir storage at the end of April in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) remained at 100 percent of available storage capacity, or a total of 75.85 billion gallons of water. The Baltimore reservoirs have been full since December 2013.

Total normal storage in the Triadelphia and Duckett Reservoirs, which serve parts of Howard, Montgomery, and Prince George's Counties in suburban areas around the District of Columbia, was 101 percent of normal storage capacity in April, with 10.56 billion gallons of water. Not all of the water in the reservoir is usable; for operational purposes, percent of normal storage capacity is used, but this value can exceed 100 percent of the usable storage.

April 2014	Percent available/ normal storage	Volume (billion gallons)	Source
<b>Baltimore Reservoirs</b>			<b>Baltimore City – Environmental Services Division</b>
Liberty	100	36.80	
Loch Raven	100	21.20	
Prettyboy	100	17.85	
Total	100	75.85	
<b>Patuxent Reservoirs</b>			<b>Washington Suburban Sanitary Commission (WSSC)</b>
Triadelphia	101	5.63	
Duckett	98	4.93	
Total	100	10.56	